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February 22, 2002

Ms. Cheri Davis
Project Manager
California Energy Commission
Energy Facilities Siting and Environmental Protection Division
1516 Ninth Street, MS-15
Sacramento, CA 95814

Subject: East Altamont Energy Center Application for Certification
Data Request Response Set #5A (01-AFC-04)

Dear Ms. Davis:

Enclosed are 17 copies of Data Request Response Set #5A. Data Request Response Set #5A provides responses to Hazardous Materials Management Data Request #142 and Cultural Resources Data Requests #'s 143 through 152.

If you have any questions, please call me at 916-920-0300.

Sincerely,

CH2M HILL

Jerry Salamy
Project Manager

Enclosure

East Altamont Energy Center
(01-AFC-4)

Data Request Set 5A

Hazardous Materials and Cultural Resources Data Request Responses

Hazardous Materials Handling Data Request: 142
Cultural Resources Data Requests: 143, 144, 145, 146, 147, 148, 149, 150, 151, and 152

Submitted to:

CALIFORNIA ENERGY COMMISSION

Submitted by:

East Altamont Energy Center, LLC

February 22, 2002

Technical Area: Hazardous Materials
CEC Authors: Dr. Alvin Greenberg
EAEC Author: Jerry Salamy

BACKGROUND

The AFC (page 8.12-17) indicated that the applicant would prepare a cumulative impacts analysis assessing acutely hazardous materials stored or used at current and proposed projects within a 5-mile radius of the project that could potentially contribute to cumulative impacts. This analysis would assess the potential impacts from a simultaneous release from other acutely hazardous material storage tanks and the proposed EAEC ammonia storage tank, assuming that the migrating clouds merged.

DATA REQUESTS

142. Please provide the cumulative impacts analysis as described in the AFC.

Response: The area of concern that the CEC has routinely considered in previous licensing cases for cumulative impact analyses is a 6 mile radius. This area threshold assumes that accidental releases which occur more than 6 miles from a power plant project would not result in ambient air concentrations of the release materials at elevated concentrations at the power plant site and adjacent areas.

The AFC indicated that the Aqua Chlor facility was located 2.5 miles from the EAEC project site. However, based on further investigation of this facility, it was determined that the Aqua Chlor facility[1] is approximately 8 miles from the EAEC project site, and that there are no other existing facilities storing or using acutely hazardous materials within 6 miles of EAEC. Since the facility is over the 6 miles from the project site, a cumulative impact analysis is not required. However, if a simultaneous catastrophic release of chlorine from the Aqua Chlor and ammonia from EAEC were to occur, the potential of these two releases impacting at concentrations that would pose a public health concern is extremely small.

[1] The Aqua Chlor facility is located at 15885 Altamont Pass Rd. Tracy, CA 95376 (Source: http://www.epa.gov/swercepp/meetings/ca_mtg.htm).

Technical Area: Cultural Resources
CEC Author: Dorothy Torres
EAEC Author: Jim Bard and Jerry Salamy

NOTE: Please submit any information that may reveal archaeological site location under confidential cover.

BACKGROUND

Western Area Power Administration has previously requested that a geotechnical report be completed for the project. This report is necessary to determine whether there are archaeological resources that may be impacted and where those resources are located. Western must identify impacts before recommending mitigation. A geotechnical report was previously submitted that did not address the potential for buried archaeological deposits. The applicant has agreed to provide this report and the purpose of including the request in this document is to ensure that the request is part of the record and that there is no misunderstanding concerning the information that is required.

DATA REQUEST

143. Please provide a geoarchaeological or geomorphological evaluation of the project including the linear components. Discuss the potential for buried intact archaeological deposits by assessing the age of soils, rate of deposition/erosion, slope, and presence of known buried sites. It is necessary that a geoarchaeologist or geomorphologist do the work. Geologists and archaeologists do not have the necessary expertise to provide the required information.

Response: A geoarchaeological evaluation of the project site and linears is contained in Attachment CR-143. This document is also included as an appendix to the revised Cultural Resource report requested in Data Request #144.

BACKGROUND

Western also previously requested a rewrite of the cultural section from the AFC to fulfill State Historic Preservation Officer (SHPO) requirements. In order to fulfill Section 106 requirements the lead federal agency must submit this report to the SHPO, which will not accept a report that does not meet their requirements. Western has provided a format for this report. The applicant has previously agreed to provide this report. The data request is included to ensure that a formal request is part of the record and to ensure that there is no misunderstanding regarding the information that is required

ATTACHMENT CR-143 GEOARCHAEOLOGICAL EVALUATION OF THE EAEC PROJECT SITE AND LINEARS

Preliminary Geoarchaeological Assessment of the East Altamont Energy Center Site and "Linears", Alameda, Contra Costa, and San Joaquin Counties, California

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January 2002

Geoenvironmental History

The Project Area is situated within a broad structural trough that forms the northern San Joaquin Valley, which is bordered on the east by the Sierra Nevada and on the west by the Diablo Ranges. This area has undergone a series of significant environmental changes since the time that people are known to have entered and inhabited the region around 10,000 years ago. During the last glacial maximum, more than 15,000 years ago, worldwide sea levels were at least 100 meters (about 328 feet) lower than today (Atwater, Hedel, and Helley 1977). At that time, the broad sloping plain that forms the continental shelf was fully exposed, because the Pacific Ocean was located more than 25 to 50 kilometers (15 to 30 miles) west of the present shoreline. Much of the Sacramento-San Joaquin Delta-Estuary area was then a broad inland valley crossed by numerous stream and river channels that supported grassland and riparian plant and animal communities. The combined runoff from the Sacramento and San Joaquin rivers formed a single watercourse that crossed the shelf before it emptied into the Pacific Ocean near the Farallon Islands (Atwater, Hedel, and Helley 1977).

As the continental ice sheets began to melt toward the end of the Pleistocene, the oceans of the world experienced a rapid rise in sea level, which caused the Pacific shoreline to migrate eastward. Between 15,000 and 11,000 years ago, sea levels rose about 55 meters (180 ft.) worldwide. By about 10,000 years ago, the rising sea passed through the Golden Gate and began to flood the inland area that would become San Francisco Bay (Atwater, Hedel, and Helley 1977). The lowest portions of the Bay and Sacramento-San Joaquin river valley were flooded as sea level rose about 25 m (82 ft.) between 11,000 and 8,000 years ago. Between about 8,000 and 6,000 years ago, sea level rise rapidly decreased to only about 7.0 m (23 ft.) over 2,000 years (Atwater 1979; Atwater, Hedel, and Helley 1977; Stanley and Warne 1994; Wells 1995; Wells and Goman 1994). Sea level has risen another 8.0 m (26.2 ft.) during the past 6,000 years, at an average rate of about 1.3 m (4.3 ft.) every 1,000 years.

Rising waters reached the western edge of the present Delta-Estuary around 7,000 years ago--about the time that sea-level rise began to slow (Atwater 1980; Atwater, Hedel, and Helley 1977; Shlemon and Begg 1975; Wells 1995). The decrease allowed sedimentation to keep pace with

submergence rates, permitting extensive tidal-marsh environments to become established in the Delta-Estuary during the Middle Holocene (Atwater et al. 1979). During the Middle and Late Holocene, the estuary marshlands continued to expand in response to higher sea levels and the decomposition, compaction, and subsidence of inter-tidal deposits (Atwater 1979; Atwater et al. 1979, Atwater, Hedel, and Helley 1977). Radiocarbon dates obtained from peat deposits (Table 1) indicate that the marshland extended into the area of Clifton Court Forebay between 4,000 and 5,000 years ago (Figure 1). Radiocarbon dates from other locations show the general trend of sea-level rise within the Delta-Estuary (Figure 2). Thus, people already occupied the region during the formation of the Sacramento–San Joaquin Delta-Estuary.

TABLE 1. Radiocarbon Dates from Clifton Court Forebay

County, Location	*Material*	*Min. Depth cm*	*14C B.P.*	*±*	*Cal B.P.*	*Lab. No.*	*Reference*
CCO, Clifton Court Forebay	Peat (muck)	172	2950	150	3130	GX-4221	(West 1977)
CCO, Clifton Court Forebay	Peat (muck)	340	3940	140	4415	GX-4222	(West 1977)
CCO, Clifton Court Forebay	Peat (muck)	368	4340	150	4865	GX-4223	(West 1977)

Note: Cal B.P. is the calibrated intercept of sample age according to Stuiver and Reimer (1993)

As the Delta-Estuary grew in size, the lower reaches of many stream and river channels became choked with sediments that spilled over bank onto the surface of existing floodplains (Helley et al. 1979). This caused sheet erosion and lateral channel migration in the upper reaches that lead to additional sediment deposition in the lower reaches. Large alluvial fans and prominent levee deposits were formed by channels—such as Marsh, Kellogg, and Sand creeks—that drain the eastern Diablo Ranges northwest of the Project Area (Atwater 1982; Brabb, Sonneman, and Switzer 1971). In the Marsh Creek drainage, these alluvial deposits are estimated to range from Late Pleistocene to Late Holocene in age (Atwater 1982). The Holocene-age deposits are estimated to range in thickness from 15.0 meters (m) near alluvial fan heads, to 3.0 m near the Delta and Bay margins (Helley et al. 1979). These changes led to the formation of an "alluvial apron around the bay plain and the extensive valleys of the region" that is graded to the present sea level (Helley et al. 1979:18).

Geological and geoarchaeological studies demonstrate that many of the older land surfaces in the region are overlain by younger deposits of alluvium, colluvium, dune sand, and/or artificial fill (Borchardt 1992; Helley et al. 1979; Knudsen et al. 2000; Mc Ilroy, Meyer, and Praetzellis 2001; Meyer 1996, 2000; Meyer and Rosenthal 1997; Pape 1978; Rogers 1988). The older land surfaces are often marked by buried soils (paleosols) that represent prolonged periods of land stability. Buried soils have been identified in many of the alluvial fans and floodplains around the Bay-Delta-Estuary that have been radiocarbon dated to less than 11,000 B.P. As such, the buried paleosols are useful

stratigraphic markers for correlating depositional sequences and locating buried archaeological deposits (Meyer 2000).

A study of the Putah Creek alluvial fan in the southwestern Sacramento Valley revealed the presence of "two distinct and extensive buried soils . . . suggest formation during epochs of relative landscape stability" (Shlemon and Begg 1972: 277). The uppermost paleosol produced radiocarbon dates of 3890 +/- 220 or 4330 cal B.P. and 4330 +/- 180 or 4865 cal B.P., while the lower paleosol was dated to 9150 +/- 650 or 10040 cal B.P. This depositional sequence represents three periods of alluviation, the oldest two being "separated by erosional unconformities and buried soils" (Shlemon and Begg 1972: 278). Investigators suggest that deposition may have occurred over a short period of time between 10,000 and 4,000 years ago, and infer that widespread alluvial deposition was initiated by "gross climatic change leading to increased runoff in the headwaters of streams draining the western Sacramento Valley." As such, the depositional sequence identified in the Putah Creek fan probably reflects regional climatic changes.

The alluvial deposits in the northeast San Joaquin Valley have been divided into a series of stratigraphic units on the basis of stratigraphic superposition, geomorphic position, and relative soil development (Atwater 1980; Harden 1987; Janda and Croft 1967; Marchand 1977; Marchand and Allwardt 1981). The youngest of these deposits are identified as the Modesto and post-Modesto formations. The Modesto Formation is subdivided into a Late Pleistocene-age lower member (<15000 cal B.P.), and a Late Pleistocene to Early Holocene-age upper member (>15000 to <9000 cal B.P.). Deposits of the post-Modesto Formation are subdivided into four units, which are designated by Roman numerals (I, II, II, IV) from the oldest to youngest deposits as shown in Figure 3. The presence of thick, coarse sand and gravel underlying the post-Modesto II alluvium "may reflect late Holocene (Neoglacial) climatic events in the Sierra Nevada" or "the reworking of pre-Holocene alluvium by major floods unrelated to a significant change in climate" (Marchand and Allwardt 1981:62). Marchand determined that the repetition of this depositional sequence is best be explained by fluctuations of climate that changed the rate at which sediments were delivered to the San Joaquin Valley.

Geologic studies indicate that episodic erosion and deposition in the San Joaquin Valley was controlled by climatic changes and not sea-level rise or tectonic activity during the Holocene (Atwater 1980; Harden 1987; Janda and Croft 1967; Lettis 1985; Marchand and Allwardt 1981; Shlemon 1971). In the west central San Joaquin Valley, thin fluvial deposits tend to be overlain by thick debris-flow deposits, which suggest that "periods of alluviation reflect transitions from more humid to more arid conditions because of changes in vegetation destabilized slopes" (Lettis

1982:181). Groundwater studies also suggest that "there was a marked increase in the annual discharge of the larger streams, which caused a change from ephemeral to intermittent flow and resulted in the wetting of previously abnormally dry deposits" in the west central part of the valley during the Holocene (Davis and Coplen 1989:36). Such a climatic shift "may have been sufficient to boost sediment-transport capacity (runoff) without greatly increasing the effectiveness of vegetation in preventing drainage-basin erosion" (Atwater et al. 1990:292). Thus, it is generally agreed that environmental conditions other than sea-level rise were responsible for sediment deposition in the northern San Joaquin Valley.

More recent environmental changes in the region include widespread erosion of the uplands, rapid sediment deposition in the lowlands, the formation of deeply incised channels in alluvium-filled valleys, and the appearance of introduced (non-native) plant species. These changes generally coincide with the arrival the Spanish and other Euro-American settlers during the 1700s and 1800s (West 1989). During the late 1800s, protective vegetation cover was greatly reduced by intense drought and livestock grazing, which made the landscape particularly susceptible to erosion (Burcham 1982:171), as did many historic logging, mining, and agricultural practices. Lasting evidence of these changes is found along many stream and river channels where the lower terraces are often composed of historic-age sediments (Knudsen et al. 2000), as are many of the estuarine deposits.

This review of the geoenvironmental history indicates that the region has undergone repeated episodes of widespread sediment deposition that buried large portions of the landscape that were available for human use and occupation during the Late Pleistocene and Holocene. Such large-scale paleoenvironmental changes were likely responsible for significant fluctuations in the availability and/or productivity of particular resources that influenced the pattern of human settlement and/or subsistence activities (Atwater et al. 1979). As a result, it is highly likely that the region's archaeological record does not accurately reflect the timing or extent of human use, because landscape evolution has resulted in the submergence, destruction, or burial of many older archaeological sites (Bickel 1978).

Geoarchaeological Context

It is apparent that a number of significant geoenvironmental changes have occurred since the time that people may have first entered and occupied the region, and that these changes could have resulted in the burial or destruction of archaeological deposits. It has long been known that natural geological processes have buried numerous archaeological sites the valleys of central California (Heizer 1949:39-40, 1950:5, 1952:9; Lillard, Heizer, and Fenenga 1939; Moratto 1984:214). This was clearly recognized in the northern San Joaquin Valley by Schenck and Dawson when they noted,

> So far as physical environment is concerned, man could thus have lived here from his most remote antiquity. But any record which he might have left would have been buried by the recent alluvium and would be difficult of access except in extraordinary circumstances or by chance. Moreover, the present wash of the alluvial fans and silting over of the valley floor would tend to obliterate quickly human remains of even a few thousand or perhaps a few hundred years ago. Accordingly the archaeologist who approaches the region has little justification for expecting to secure very ancient data [Schenck and Dawson 1929:294].

Yet despite this realization, very few studies have attempted to integrate the findings of geological and archaeological studies in order to evaluate the potential effects of landscape change on the nature and completeness of the region's archaeological record. Given the potential biases imposed by natural landscape evolution, the lack of systematic geoarchaeological studies is an ongoing problem for investigators that attempt to interpret the relationships between regional site distribution patterns and demographic and settlement/subsistence change. For instance, the predominance of Late Holocene archaeological sites in central California is often interpreted as prima facie evidence for increased human population densities and changes in settlement subsistence patterns during the past 4,000 years (e.g., Beaton 1991:950-951; Bouey 1987:66; Broughton 1994; Schulz 1981:184). However, the apparent "increase" may be the result of natural changes that affected the visibility of archaeological sites more than 4,000 years old, instead of a true reflection of cultural changes.

Geoarchaeological investigations conducted in the Los Vaqueros area of eastern Contra Costa County about 8 miles northwest of the Project Area (see Figure 1), revealed that three or more episodes of deposition were responsible for the formation of a 15,000-year-old alluvial sequence in the Kellogg Creek Valley (Meyer and Rosenthal 1997). Each of these depositional episodes was followed by a separate period of landform stability and soil formation during the Early, Middle, and Late Holocene. The nature and timing of the Los Vaqueros depositional sequence is comparable to the depositional histories identified in other Bay Area valleys (Banks, Orlins, and McCarthy 1984; Borchardt 1992; Helley et al. 1979; Meyer 1993; Pape 1978; Rogers 1988), suggesting that these changes may have been widespread and roughly synchronous (Meyer 1996). Some of the oldest archaeological deposits yet identified in the region, dating to the Early and Middle Holocene, were found in association with soils buried by alluvium within the valley (Figure 4). The presence of these early sites indicates that people have occupied area for nearly 10,000 years. The findings from Los Vaqueros suggest that alluvial landscape evolution has dramatically affected the nature and

completeness of the archaeological record in the valleys of the region (Meyer and Rosenthal 1997:V.15).

A recent GIS-based analysis of the distribution of prehistoric sites in the Sacramento-San Joaquin Delta indicates that,

> Archaeological sites are spread disproportionately across the study area, and three of the nine composite landform groups, which cover 62.6 percent of the Delta, contain 93.8 percent of the sites. Alluvium of super-tidal flood plains represents 33 percent of the total acreage within the Bay-Delta study and yet 54 percent of the prehistoric sites are located within these landforms. Eolian deposits cover just over 3 percent of the Delta landforms yet they contain 16 percent of the sites. Alluvial fans and fan terraces, other than Modesto Formation fans, cover 27 percent of the study area and contain 24 percent of the sites. Modesto Formation fans account for 11 percent of the study area yet contain only 3.4 percent of the sites [West, Hansen, and Welch 1999:7].

The results of this study demonstrate that most prehistoric sites are located along present or former water sources, and/or less than about 2 miles from the present margins of the Delta-Estuary (Figure 5).

As noted in the *Geoenvironmental Setting* above, the alluvial fans, floodplains, and basins on the floor of the northern San Joaquin Valley have a long and complex depositional history that is only partly understood. Geological and archaeological studies have generated radiocarbon dates and other information that are useful for evaluating sedimentation rates in the northern San Joaquin Valley. The age and depth of selected dates are compared in Figure 6, which shows that most Late Pleistocene to Early Holocene-age samples occur at depths ranging from about 1.3 m (4.2 ft.) to 4.0 m (13.1 ft) below surface, while most Middle Holocene-age contexts range from 1.2 m (4.1 ft.) to 2.2 m (7.2 ft) below surface. The depth of the Late Holocene contexts varies significantly from 0.1 m (0.3 ft) to 8.5 m (27.8 ft) below surface, with most occurring at depths of 0.9 m (2.9 ft) to 1.2 m (4.1 ft) below surface. Thus, there is a strong, but clearly non-linear, relationship between the age and depth of natural and cultural contexts in the region. Variations in the rate of sedimentation probably reflect circumstantial differences in the geomorphic position, climatic history, and vegetation cover at individual locations over time

This contextual information indicates that people have occupied the region for at least 10,000 years, and that younger geological deposits have buried most Early and Middle Holocene-age sites. These findings emphasize the potential influence of large-scale landscape evolution on human occupation and the subsequent preservation and visibility of the region's archaeological record. As

such, future archaeological studies should anticipate the potential for older archaeological remains to be buried in the lowland areas of the region.

Geoarchaeological Assessment

Archaeological sensitivity can be conceptualized as a set of factors that either encouraged or discouraged human use or occupation of a given area, combined with those that affected the subsequent preservation of archaeological remains in that area. Given that prehistoric settlements are generally associated with stable landforms located near water sources, the present and former position of stream and river channels are useful for determining the possible site locations. As already mentioned, sediment deposition has probably resulted in the burial of sites located in lowland areas. Furthermore, artificial cutting and filling can also result in the destruction or burial of archaeological sites; particularly those that were located near the historic ground surface. While it is impossible to predict the exact location of every site that may be buried, it is possible to identify archaeologically sensitive areas based on a combination of human settlement patterns and favorable geologic settings.

If people occupied the Project Area prehistorically, it is likely that the San Joaquin River would have served as a source of fresh water that would have attracted human settlements. The present course of the "Old River" channel of the San Joaquin River is located slightly more than one-mile east of the Project Site, and a little more than 1,000 ft. (305 m) east of the southernmost Linear. The southernmost Linear also intersects the present channel of Mountain House Creek in San Joaquin County, which may have served as a source of water at least seasonally. In addition, the Project Site was located about 3 miles of the Delta-Estuary 4,000 to 5,000 years ago, and about 1 mile from the margins of the Delta-Estuary as it existed in the 1850s (see Figure 1). It is likely that these water sources provided suitable habitats for a variety of plants and animals that were targeted and used by prehistoric inhabitants of the area. In addition, portions of the Project Area may have served as a dry land corridor for people traveling around the southern edge of the expanding wetlands.

The East Altamont Energy Center Site and Linears are situated on alluvial fan deposits that slope gently from the southwest to northeast. Geologic mapping indicates that the fans are bounded to the east by Late Holocene-age alluvial fan (Qhff) and alluvial floodplain (Qhfp) deposits, and to the west by sedimentary rocks that are pre-Quaternary in age (Figure 4). As shown in Figure 7, the alluvial fan located between the California Aqueduct and the Delta Mendota Canal is Latest Pleistocene (Qpf) in age, while the alluvial fan located southeast of Delta Mendota Canal is considered to be Latest Pleistocene to Holocene (Qf) in age (Figure 4). Although not shown on Figure 7, the southeastern Linears are associated with the Qf-fan, which extends into San Joaquin County.

The soil at the surface of the Qf-fan is mapped as Rincon clay loam (Welch et al. 1966). Rincon series soils are characterized by well-developed subsurface horizons of accumulated clay (Bt) and/or calcium carbonate (Bk). In the surrounding region, these soils are generally associated with alluvial fans that are Latest Pleistocene to Holocene in age (Knudsen et al. 2000). In the Los Vaqueros area northwest of the Project Area, a buried soil was recognized in an alluvial fan overlain by Rincon soils (Western Arm profile). A radiocarbon date of 11,180 cal B.P. was obtained from the buried soil at a depth of 300 cm below the surface (see Figure II.8 in Meyer and Rosenthal 1997). The age of the paleosol and the degree of soil development in the overlying deposit indicate that a Pleistocene land surface was probably buried during the Latest Pleistocene or earliest Holocene. This stratigraphic sequence suggests that older alluvial fans tend to occur along the margins of large and small valleys.

On 14 January 2002, the author made a brief field visit to the Project Area to examine the landforms and to search for exposures of subsurface stratigraphy. As a result, a large subsurface exposure was found in the wall of a canal that is located within the Qf-fan near the southeastern most Linear, just east of Wicklund Road. A laterally extensive soil was observed in the exposure at a depth of about 2.7 to 3.0 m below the surface (Figure 8). The buried soil exhibited a well-developed subsurface horizon of accumulated clay and calcium carbonates (Btkb, see Figure 8). Although the age of the buried soil is not known, it may date to the Latest Pleistocene or earliest Holocene such as the one identified at Los Vaqueros. The age of the buried soil could be easily determined by submitting a sample for radiocarbon dating analysis. The overlying deposit exhibited a moderately well developed subsurface soil horizon of accumulated clay and carbonates; similar surface deposits were also observed within an irrigation canal located just south of the proposed Project Site. It is not known if the buried soil observed at the south-end of the Project Area extends beneath the surface of the Project Site within the Qf-fan. The presence or absence of this buried soil could be easily determined through limited subsurface explorations within the Project Site. In addition, an area of more weakly developed soil formed in gravelly alluvium was observed in a construction cutbank near the intersection of Kelso Road with Byron-Bethany Road in San Joaquin County (Figure 8). The presence of this younger alluvium suggests that small areas of younger deposits have not been accurately mapped within portions of the Qf-fan. This may be particularly true in the vicinity of Mountain House Creek.

This preliminary geoarchaeological assessment suggests that those portions of the Project Area intersecting the Qf alluvial fan deposits have the potential to contain buried archaeological remains, particularly in the area around Mountain House Creek (southeastern Linears). The Qf

alluvial fan should be considered archaeologically sensitive because, (1) portions of the fan were located near water sources, and (2) portions of the fan that were available for human use or occupation appear to have been buried by the deposition of younger sediments. At the same time, it appears that those portions of the Project Area associated with the Qpf alluvial fan and the pre-Quaternary bedrock have little or nor potential of containing buried archaeological remains because, (1) the deposits pre-date human occupation of the region, and (2) the deposits have not been buried by younger sediments. Thus, it is expected that any archaeological remains associated with the Qpf-fan deposits or pre-Quaternary bedrock should be located at or near the present ground surface.

Discussion and Recommendations

One of the most difficult issues faced by archaeological investigations is the problem of locating sites that may be buried or submerged by natural geological processes such as those that have occurred in and around the Sacramento-San Joaquin Delta-Estuary. This problem is compounded in areas where sites may also be hidden beneath portions of the built environment (e.g., buildings, roads, levees, etc.). Consequently, buried sites are most often discovered after being inadvertently exposed by natural erosion or mechanical earth-moving, and only rarely are they intentionally found as a result of conventional surface surveys.

Based on the foregoing review, a geoarchaeological approach is considered as the most effective and efficient approach for identifying potential buried archaeological resources within the Project Area. This approach attempts to locate buried archaeological resources by targeting segments of the landscape (landform-sediment assemblages, or LSAs) that were stable and available for human use and occupation at different times in the past. The approach attempts to rule out certain landform deposits that may have been either unavailable or too unstable. The primary goal of the approach is not to locate every buried site that may exist in a given study area, but rather to reduce the area and/or volume of sediments that needs to be searched, thereby increasing the likelihood that potentially buried archaeological resources will be identified. The ability to locate buried sites depends on the whether or not sensitive LSAs are adequately explored for evidence of past human activity using appropriate methods and techniques.

As the landscape is forever altered by human use and development, it is increasingly important that archaeologists and cultural resources managers attempt to locate and evaluate buried sites before they are inadvertently destroyed (Meyer 1996). The discovery and analysis of previously unidentified archaeological sites is crucial for archaeological inquiry because without new or comparative data, many important questions regarding chronology, settlement, and subsistence cannot be properly addressed or answered, and current research questions cannot be confirmed,

denied, or refined beyond our present understanding. Further, it is imperative that previously unknown sites are identified to insure that potentially important archaeological resources are not inadvertently affected. Thus, it is critical that a good faith effort is made to identify archaeological resources that may be buried within the Project Area.

It is recommended that a detailed geoarchaeological study be conducted to more accurately evaluate the potential buried archaeological sites in different portions of the Project Area. The study should determine if land surfaces (buried soils) that were formerly available for human use and occupation have been buried by younger geological deposits, particularly within portions of the Qf alluvial fan deposits (Figure 6). This can be accomplished by conducting limited subsurface geoarchaeological explorations in portions of the Project Area where significant earth-disturbances are proposed. This study should focus on the age, nature, and extent of subsurface geological deposits, while providing an opportunity for the discovery of buried archaeological remains. The study should be conducted by a competent and professional geoarchaeologist who is able to identify and describe soils and sediments in accordance with standards outlined by Birkeland et al. (1991), Retallack (1988), Schoeneberger et al. (1998), and the Soil Survey Staff (1998).

Radiocarbon dating should be used to determine the age of buried soils if they are found to occur in proposed impact areas. Soils and sediments can be directly dated if they contain biogenic carbon in the form of organic matter or humates (i.e., soil organic matter or SOM). The differential decomposition, humification, and translocation of biogenic carbon in a given deposit determine the type and amount of SOM available for dating. The accuracy of soil dates depends on the researcher's ability to select samples that will minimize potential contaminants (Scharpenseel 1979) and to properly interpret the context of the sample (Matthews 1985). The C-14 age of a soil or sediment reflects the apparent mean residence time (AMRT) of the total organic content of the analyzed material. Understood in this way, the C-14 age of a soil does not mark a single time or event, but reflects the influence of multiple processes that affect the soil carbon system over time.

By using these methods and techniques it will be possible to better predict the potential for buried sites once the nature and age of buried landforms has been determined. In addition, it might be helpful to review relevant geotechnical documents that may be produced for the Project to determine if they contain information that is important for the geoarchaeological study. At the same time, the geoarchaeological study may generate paleoenvironmental information that is useful for understanding the relationships between landscape evolution and human occupation in the Project Area.

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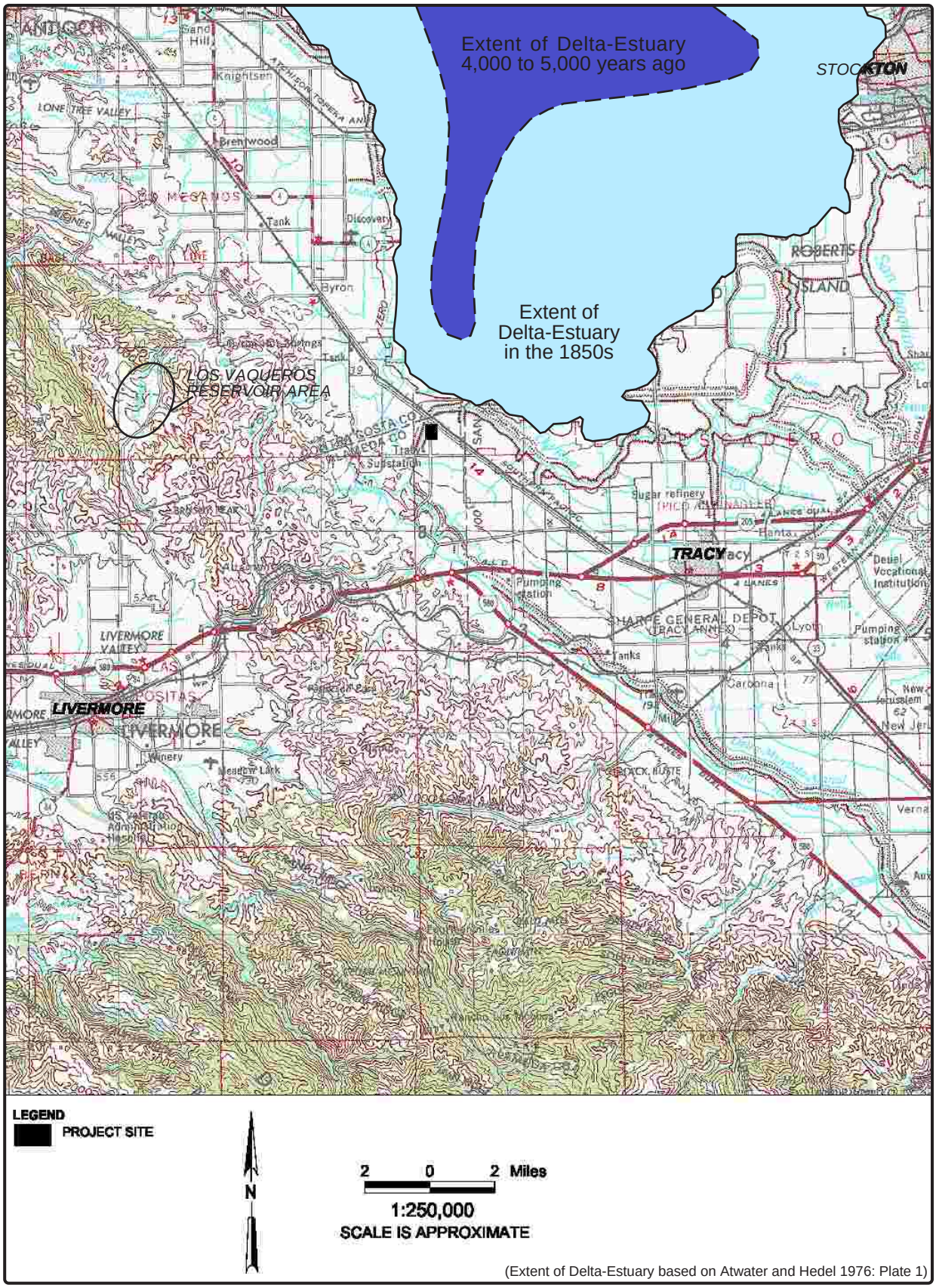


FIGURE 1. Timing and Extent of Delta-Estuary Formation near the Proposed East Altamont Energy Site

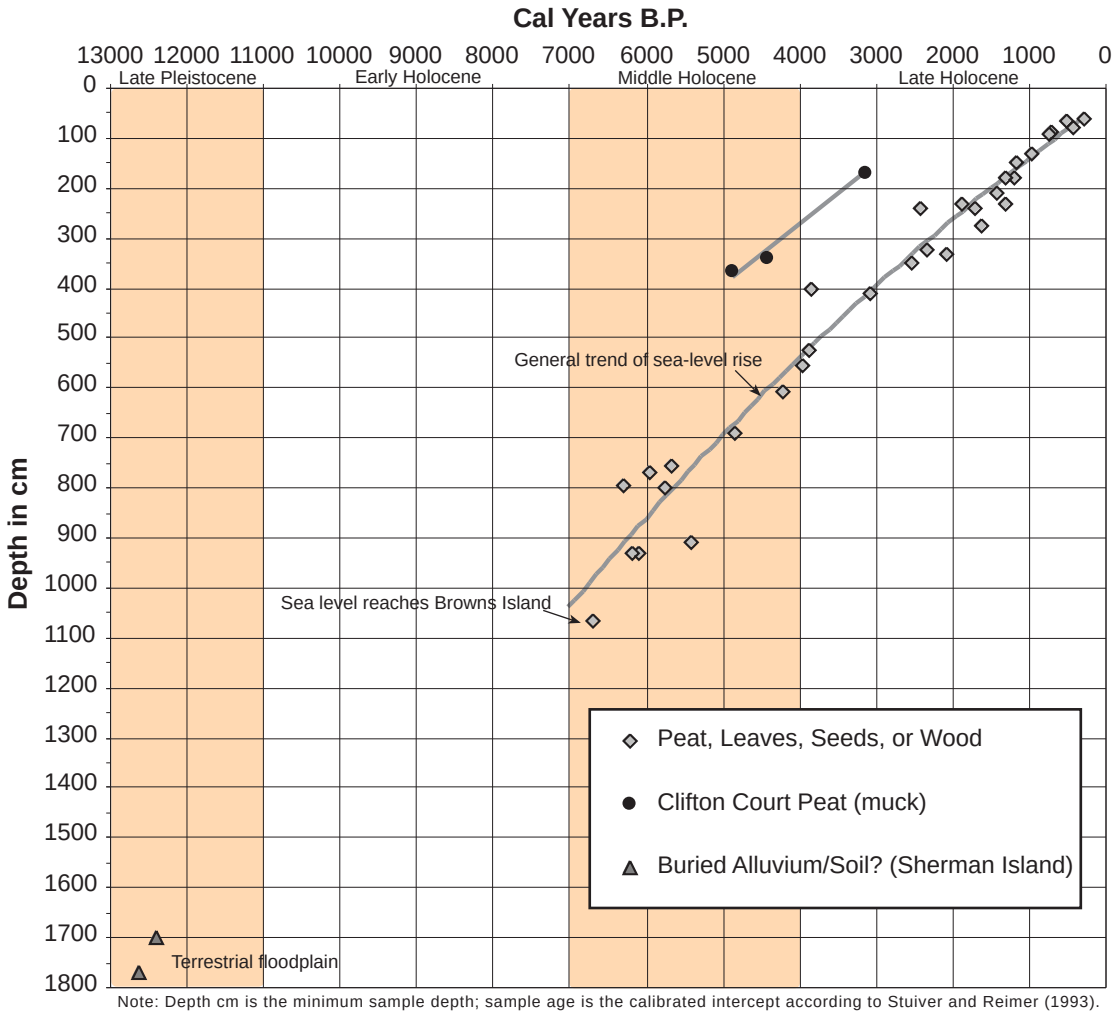
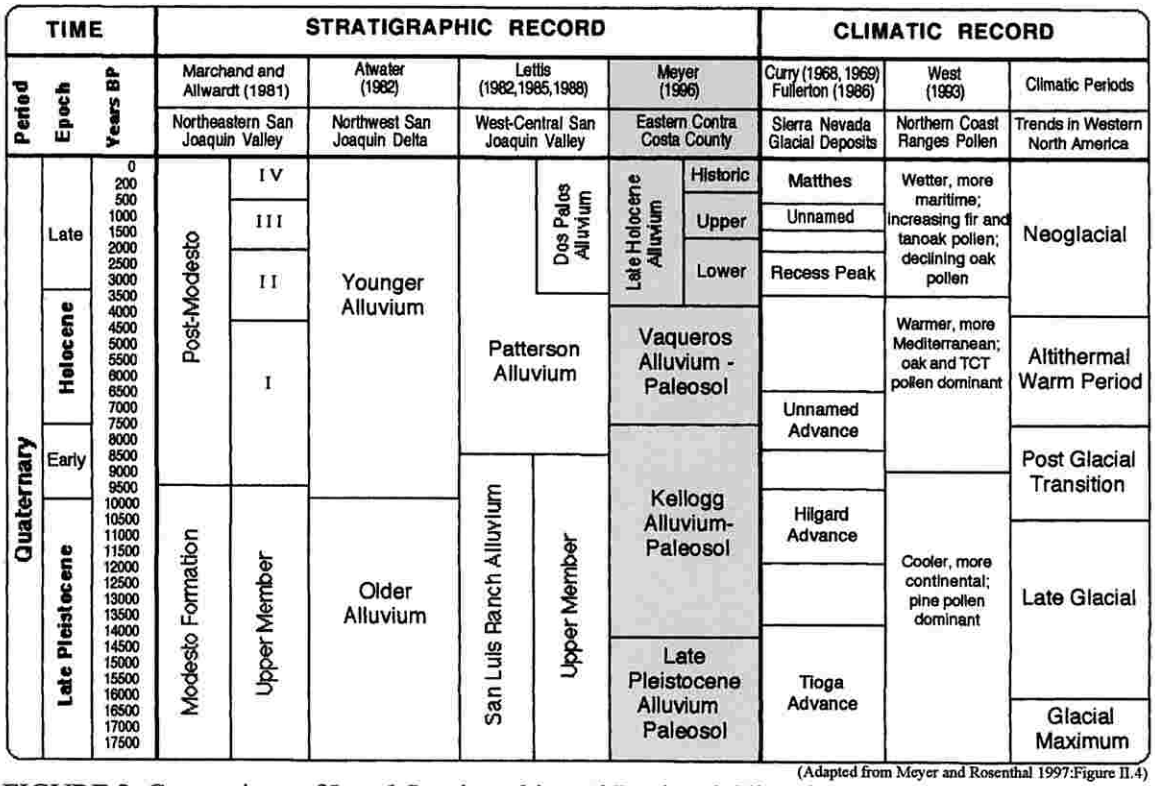
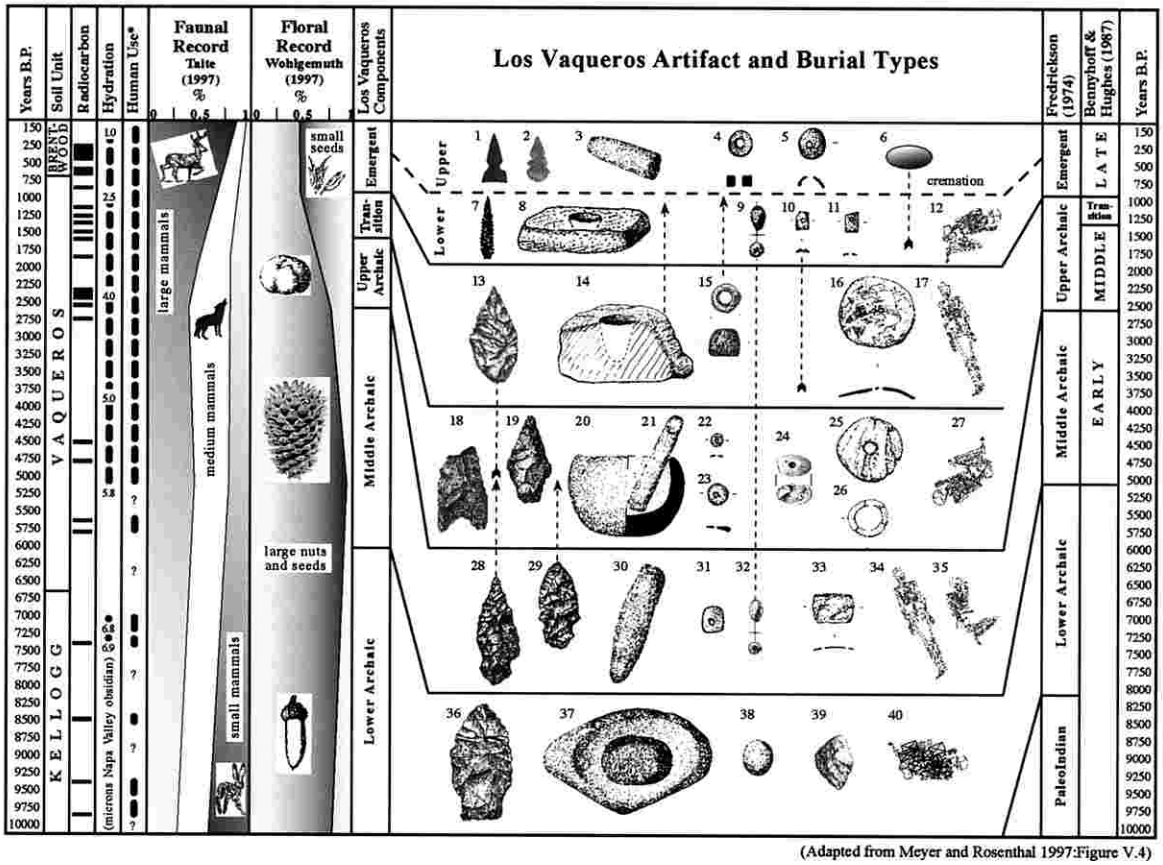


FIGURE 2. Age and Depth of Selected Radiocarbon-Dated Samples from the Delta-Estuary. Note that Clifton Court Forebay samples are 2.0 to 3.0 m shallower than similar-age samples.



(Adapted from Meyer and Rosenthal 1997:Figure II.4)

FIGURE 3. Comparison of Local Stratigraphic and Regional Climatic Sequences



(Adapted from Meyer and Rosenthal 1997:Figure V.4)

FIGURE 4. Comparison of Stratigraphic and Cultural Sequences from the Los Vaqueros Area

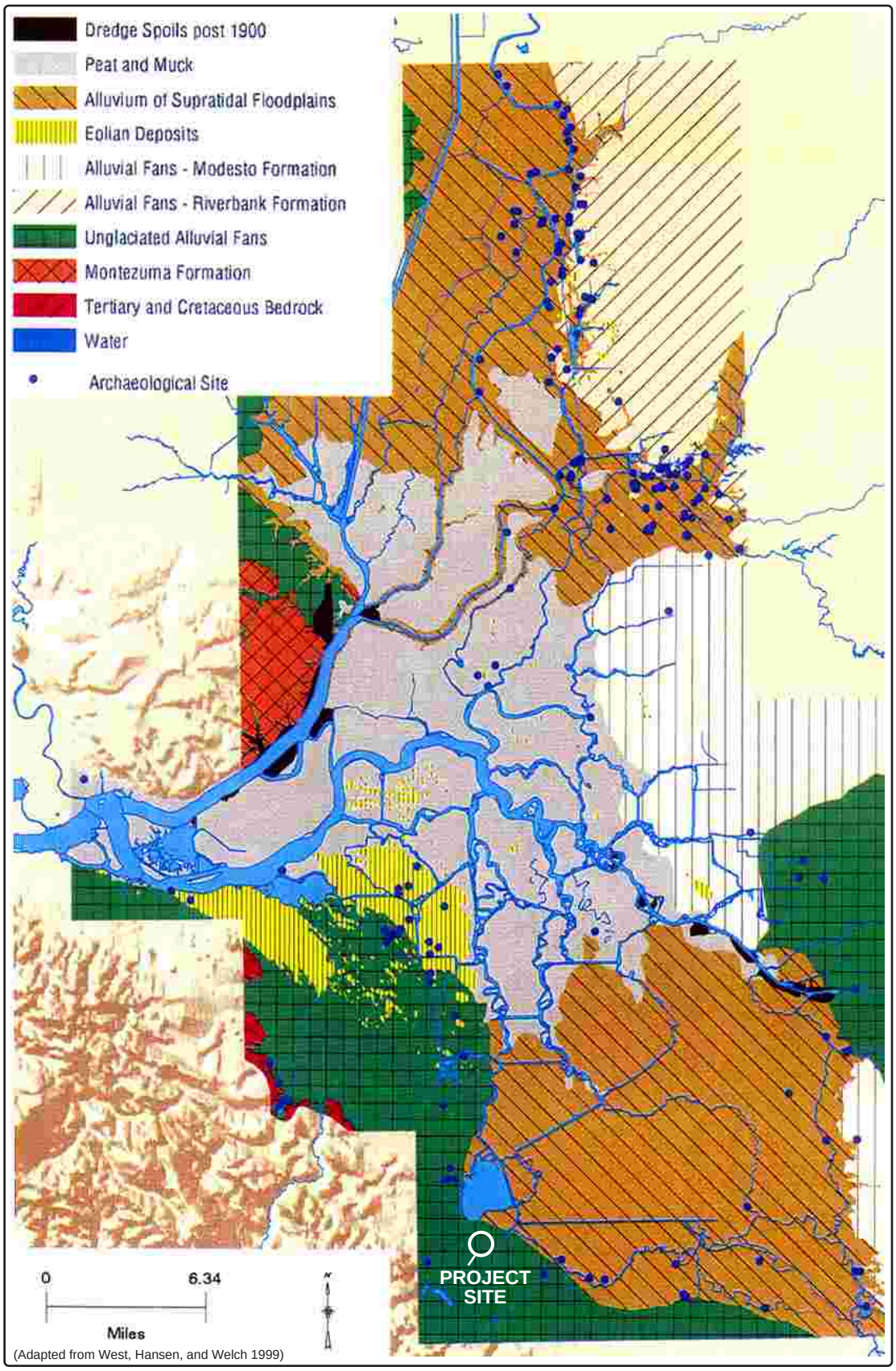


FIGURE 5. Distribution of Geological Deposits and Prehistoric Archaeological Sites in the Delta Area

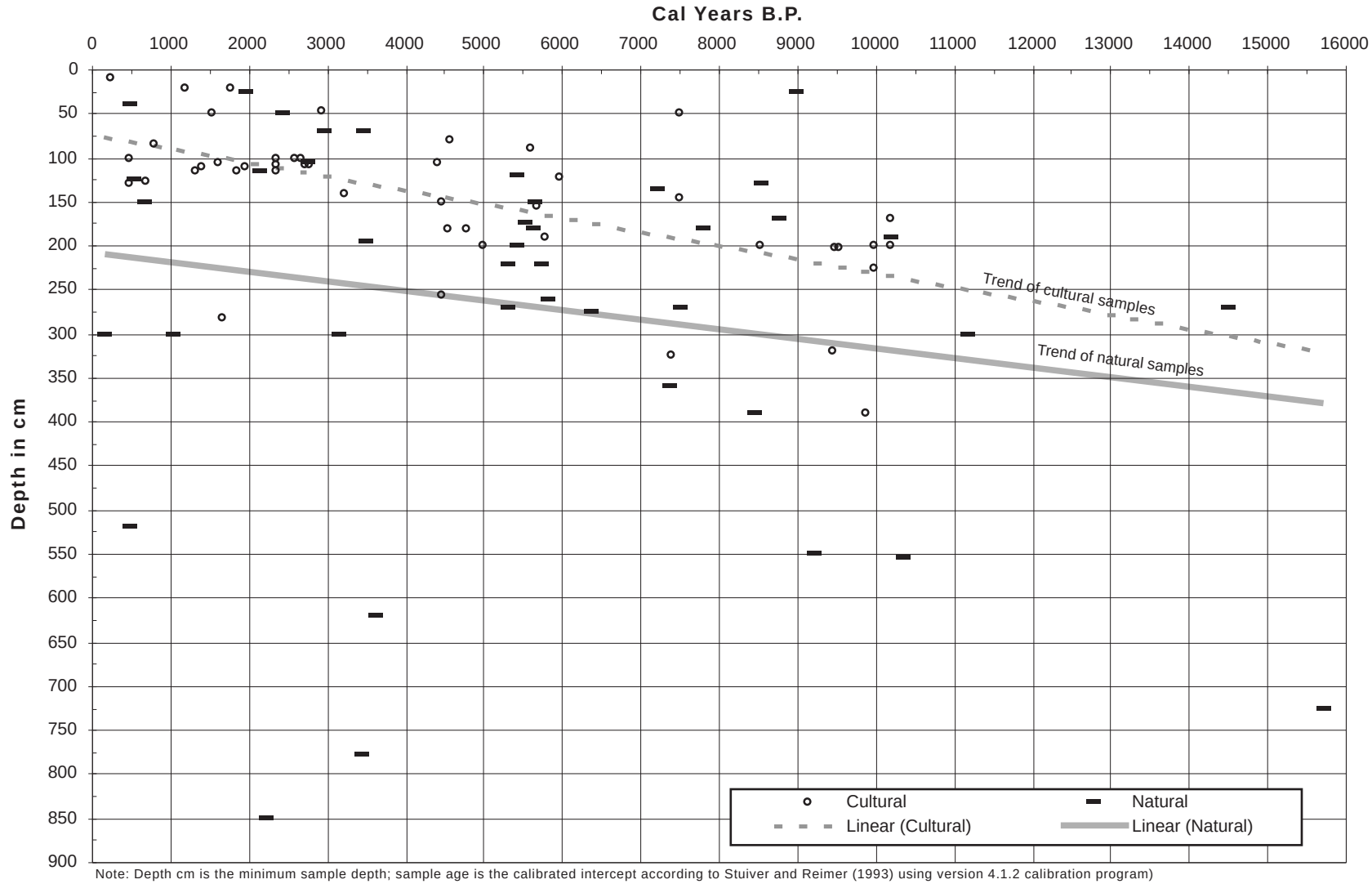


FIGURE 6. Age and Depth of Selected Natural and Cultural Contexts Radiocarbon Samples from the Northern San Joaquin Valley

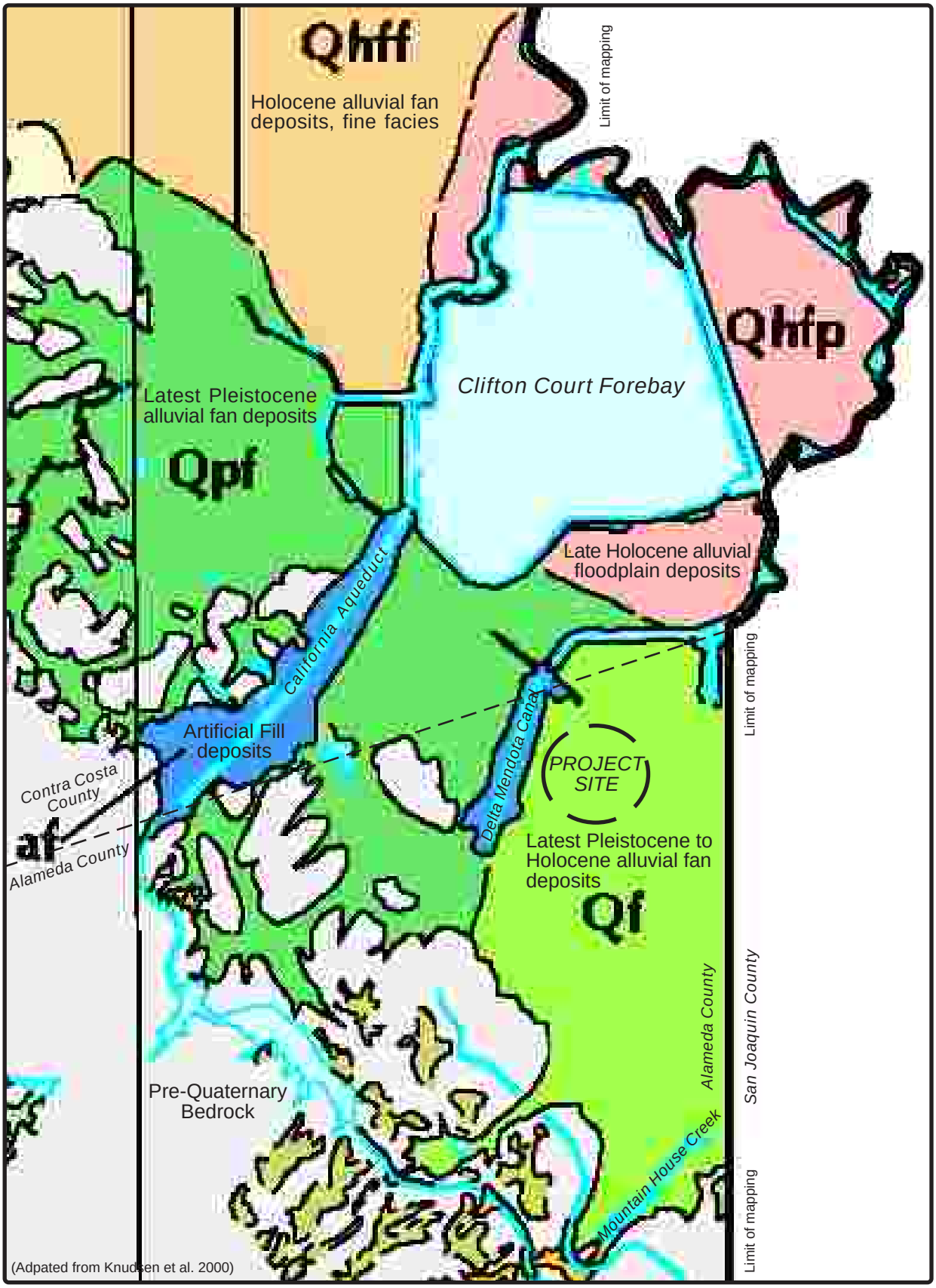
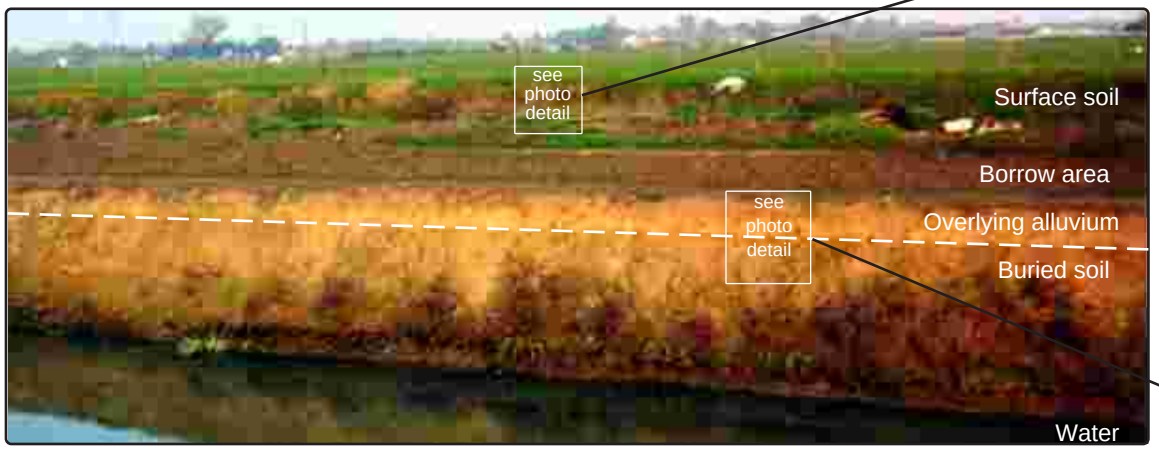


FIGURE 7. Age and Extent of Geological Deposits near the Proposed East Altamont Energy Site

Weakly developed soil formed in gravelly alluvium exposed near Kelso Road, looking northwest. Note the apparent absence of subsurface horizons.



Well developed buried soil exposed in canal east of Wicklund Road, looking southeast

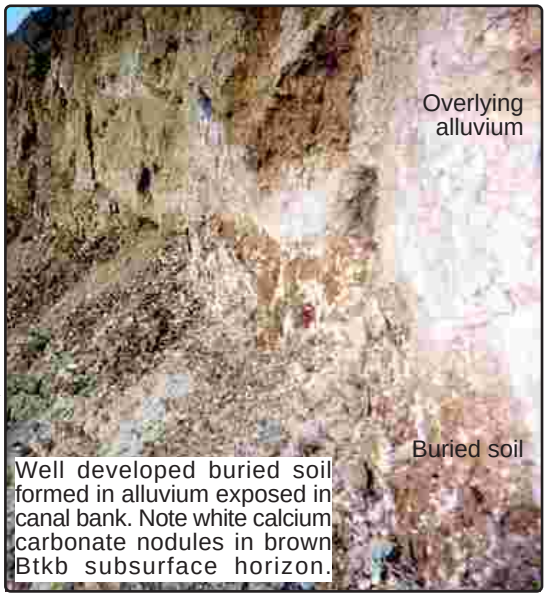


FIGURE 8. Soil Profiles Exposed in or near the Project Area

DATA REQUEST

144. Please provide the previously requested report, using the format provided by Western.

Response: The revised Cultural Resources Report, including the geoarchaeological evaluation as an appendix, is being submitted under a request for confidentiality. A copy of the report is being transmitted directly to the Western cultural resource specialist.

BACKGROUND

Staff has recommended a segment of The Delta Mendota Canal and The Westside Irrigation District as eligible to both the National Register of Historic Places and the California Register of Historic Resources.

DATA REQUEST

145. Please provide a detailed discussion of all potential ground disturbance and construction activities within 100 feet of these historic resources. If boring or trenching will be used, address the dimensions of any pits or trenches.

Response: The EAEC raw water line will be constructed using the horizontal directional drilling (HDD) technique under the Delta Mendota Canal Intake Channel. The HDD bore pit and receiving pits will be located more than 100 feet from the Intake structure to accommodate the bore. The actual bore (the hole the water pipeline will be pulled through) is expected to be approximately 24 inches in diameter and may be located less than 100 feet under the canal. However, no impact to the canal is expected from the HDD bore.

The recycled water pipeline route, as shown in Figure 2 of Supplement C (docketed on February 6, 2002), crosses over to Wickland Road along Bethany Road and therefore does not pass within 100 feet of the Westside Irrigation District.

BACKGROUND

The Bureau of Reclamation has expressed concern regarding construction activities in the vicinity of canals, aqueducts or other facilities under their jurisdiction.

DATA REQUEST

146. Please verify whether a permit or some other type of legal agreement is necessary to construct within their right-of-way or area of responsibility.

Response: The United States Bureau of Reclamation is the authority that would issue an encroachment permit for the construction of the raw water or revised natural gas line along or under the Delta Mendota Canal or Aqueduct, with the concurrence of the San Luis & Delta Mendota Water Authority (SL&DMWA). The Applicant met with both SL&DMWA and USBR in January 2001 to discuss the two linear facilities and was apprised of the process for

obtaining an encroachment permit. The Applicant has continued to work with both agencies and in consequence has revised its preferred natural gas line as detailed in Supplement C.

BACKGROUND

In the first round of data requests, staff requested the applicant to obtain from local cities and counties lists of cultural resources from local cities and counties that have been found to be historical under a local ordinance. The applicant has provided a list for Contra Costa County.

DATA REQUEST

147. Please provide additional lists for Alameda and San Joaquin Counties. If contacts have determined that there are no lists, please provide documentation of the source of the information.

Response: Attachments CR-147 A and B contain copies of the Alameda and San Joaquin Counties historic resource lists. Due to the size of these lists, five copies are provided with this Data Request.

BACKGROUND

Letters were sent to representatives of the Native American community that provided information about the project. In order to determine whether all concerns raised by Native American have been addressed and to adequately identify all potential resources, staff needs the following information.

DATA REQUEST

148. Please provide copies of any responses received by mail from Native Americans. If a response was received by telephone, please provide a written summary of the conversation.

Response: Attachment CR-148 contains the only response received from the Native American organizations contacted by the Applicant.

BACKGROUND

The PG&E Distribution Line (#7 in PAR's historic evaluation forms) is in the area of potential effect and under the National Environmental Policy Act needs to be considered regarding impacts. An evaluation of this line is essential to the impact analysis. This 60kV line is more than 50 years old, a portion of the project will cross under it and power poles may need to be replaced.

Attachment CR-147-A

Alameda County Historical Resource Directory

ATTACHMENT CR-148 - RESPONSE RECEIVED FROM THE NATIVE AMERICAN ORGANIZATIONS CONTACTED BY THE APPLICANT

Attachment CR-144

Archaeological Resource Management Report

Attachment CR-147-B

San Joaquin County Historical Resource Directory

CH2M HILL
2300 NW Walnut Blvd.
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL

May 3, 2001

161327.LS.05.CR

Ms. Irene Zwierlein
789 Canada Road
Woodside, CA 94062

Dear Ms. Zwierlein,

Subject: Calpine Corporation – Proposed Power Plant

CH2M HILL is assisting Calpine Corporation with environmental permits for a natural gas-fired electrical generating plant to be constructed near Tracy, California. Please find attached a pair of maps that show the project area and its associated linear facilities.

Mr. Larry Myers of the Native American Heritage Commission suggested that we contact you regarding this project. We would appreciate your letting us know if there are any culturally sensitive areas within the immediate project vicinities so that we can avoid impacts from the project or lessen project impacts to a less than significant level. Thank you in advance for your cooperation and assistance. I can be reached by telephone at (541) 758-0235 (ext. 3662), by fax at (541) 752-0276 or by e-mail at *jbard@ch2m.com*. A letter response can be sent to my attention at CH2M HILL, Inc., 2300 NW Walnut Blvd, Corvallis, OR 97330.

Sincerely,

CH2M HILL

James C. Bard
Cultural Resource Specialist

Enclosures –Maps
c: EJ Koford/SAC

AMAH/MUTSUN TRIBAL BAND (AMAH)
789 CANADA ROAD
WOODSIDE, CA 94062
650-851-7747
FAX 851-7489
E MAIL AMAHMUTSUN@AOL.COM

MAY 16, 2001

CH2MHILL
2300 NW WALNUT BLVD.
CORVALLIS, OR 97330

REGARDING CALPINE CORP. PROPOSED POWER PLANT

TO JAMES BARD

THANK YOU FOR YOUR LETTER ABOUT CULTURAL RESOURES THAT MIGHT IMPACT YOUR JOB SITE IN THE OHLONE/COSTANAOAN TERRITROY

AS YOU KNOW THE OHLONE TERRITORY IS SENSITIVE TO HISTORICAL ISSUES AS WELL AS NATIVE AMERICAN HUMAN REMAINS.

THE MORE THEY DIG IN THE OHLONE/COSTANOAN TERRITROY THE MORE LIKLEY THEY ARE TO ENCOUNTER SOMETHING HISTORICAL OR A NATIVE AMERICAN SITE.
IN SOME INSTANCES EVEN IF THEY HAVE EXCAVATED BEFORE, YOU CAN ENCOUNTER REAMINS.

LAWS HAVE CHANGES. IT IS NOW A FELONY, CONCERNS HAVE CHANGED, INDIANS ARE MORE INTERESTED, AND ARCHEOLOGIST ARE SHOWING CONCERN.
AND MOST IMPORTANTLY WE ARE WORKING CLOSELY WITH THE NATIVE AMERICAN HERITAGE COMMISSION (NAHC) AND THE CALIFORNIA PUBLIC UTILITIES COMMISSION (CPUC) AND OF COURSE THE LANDOWNERS AND CONTRACTORS.
CONTRARY TO BELIEF THIS TRIBE WOULD LIKE TO WORK WITH AGENCY'S NOT HINDER THEM

AND WHEN IN DOUBT YOU CAN ALWAY CONTACT OUR OFFICE WE DO BELIEVE THAT YOU SHOULD BE AWARE THAT WE ARE THERE TO HELP IN ANYWAY WE CAN.

OUR TRIBE HAS 10 QUALIFIED CULTURAL MONITORS AND THEY ARE VERY PROFFESSIONAL.
IF YOU NEED OUR SERVICES PLEASE DO NOT HESITATE TO CALL
(The NAHC stated that you should do a record search of the sacred land files and I know that should have been only the beginning, walk over of the land area. Talking with all concerned Native Americans.)

THANK YOU

IRENNE ZWIERLEIN,
TRIBAL CHAIR

IRENNE ZWIERLEIN 5/20/2001

THANK YOU FOR THE INFORMANTION ON THE PROPOSED POWER PLANT
THE PERSON THAT YOU SHOULD BE TALKING TO IS KATHRINE PEREZ, KATHY KNOWS
THAT AREA VERY WELL. KATHY IS ON YOUR CONTACT LIST FRON CNAHC

HAVE A GOOD PROJECT

DATA REQUEST

149. Please provide an evaluation of this cultural resource completed by an historian who meets the Secretary of the Interior Standards in architectural history, historic architecture, industrial history or public history. The evaluation should include an historic context sufficient for evaluating the resource. Complete DPR 523 forms A through L as appropriate and provide copies. As part of the evaluation, please address the following questions:

    a. Was this the first or longest 60kV line in California?

    b. Where does this line fit into electric development, in California, in the United States?

    c. What entity provided power for the West Side Irrigation District? Was it this PG&E distribution line?

    d. Will any power poles on this line need to be replaced.

    Response: EAEC LLC has contracted with Peak and Associates to complete a historical evaluation of the PG&E 60 kV distribution line. This report will be available for docketing by the end of March.

BACKGROUND

It appears that the Tracy Pumping and Switching Stations (PAR historic resource #11) may have contributed to the history of the Delta Mendota Canal which has been recommended as eligible to the California Register of Historic Resources.

DATA REQUEST

150. Please provide an evaluation of this cultural resource completed by an historian who meets the Secretary of the Interior Standards in architectural history, historic architecture, industrial history or public history. Ensure that an historic context is provided that is adequate for evaluating the resources. Evaluate the Pumping Station and Switching Stations separately, complete DPR 523 forms A through L, as appropriate for each historic resource and provide copies. As part of the evaluation, please address the following questions.

    a. Are the pumping and/or switching stations an integral part of the Delta Mendota Canal? If appropriate, consider each as part of the Delta Mendota Canal rather than as a separate resource. Explain the choice of assessing it separately or as part of the canal.

    b. Please discuss the character defining elements and how much the new construction changes the integrity of the resource?

c. Photos included in the PAR DPR 523A indicate that transmission yards and transmission towers dominate the station area. Please provide a discussion of the transmission yards, their age and how they relate to the pumping and switching stations.

Response: EAEC LLC has contracted with Peak and Associates to complete a separate historical evaluation for the Tracy Pumping Station and the Western Switching Station. This report will be available for docketing by the end of March.

BACKGROUND

It appears that the reclaimed water line may impact the previous location of the town of Wicklund.

DATA REQUEST

151. Per our discussion at the PSA Workshop, if available, please provide any cultural resources reports concerning the Wicklund site completed for other projects in progress in the area. If not available, please provide a test plan to identify site boundaries.

Response: EAEC LLC's consultant contacted the Director of Operations (Mr. Stan Ploof) for the Mountain House Community Service District's wastewater treatment plant regarding any cultural resource reports prepared for the construction of any Mountain House Community Service District facilities. Mr. Ploof indicated the only cultural resource reports prepared were two reports prepared for the Environmental Impact Report (prepared in 1989 and 1991). A review of the AFC Cultural Resource reference section (Section 8.3.8) shows that these reports were reviewed for the preparation of the AFC (the first two references in Section 8.3.8). Furthermore, site records from the 1991 report were submitted to the CEC under a request for confidentiality for Site P-39-000343 on August 17, 2001.

Due to the detailed location information contained in the Presence/Absence Test Plan, EAEC LLC is submitting this plan under the same request for confidentiality as the reformatted Cultural Resources Report submitted in response to Data Request #144. A report of the findings of the Presence/Absence Testing will be submitted to the CEC.

152. If archeological deposits are identified in the project area, please provide in the report a discussion of the significance of the site under CEQA Section 15064.5 (a) (3) (A)-(D), including the research values that are contained in the deposits and the associated research questions that could be answered through data recovery.

Response: No reports were identified per the response to Data Request #151.